

SCIENCE

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PLANS AND WORK AT CLARK UNIVERSITY.

THE commencement exercises of Clark University, which marked the opening of its second academic year, were held in the large hall of the university building, Oct. 4, 1890. About one thousand persons were present. Stephen Salisbury, Esq., presided, and made an opening address. The address of President G. Stanley Hall was as follows:—

“When called upon to consider the invitation with which the trustees of this university honored me, two and a half years ago, I was in an institution which, in the less than fifteen years of its existence, had done a work in stimulating other institutions, and in advancing the highest standards, which was, as I think all cheerfully admit, beyond comparison in the recent history of higher education in this country. After studying Worcester and the New England situation, I saw the opportunity here to be so great for a further and no less epoch-making step, that I felt that assured career, and even an important department, new in this country and full of fascinations, and in the most critical stage of its development, ought not to weigh against it. Permission was at once given me to begin my preparation for this important work by studying foreign institutions for a year. I visited every European country but Portugal, and found everywhere great and surprising advances since my own student life abroad had ended.

“In France the best and most original professors had been selected from among the various higher institutions of Paris (the Sorbonne, the College of France, Ecole Normale, and the great special institutes), and organized by the government into a new and still higher institution devoted to the most advanced work, and largely to research. This institution, the Ecole des Hautes Etudes, has some features of the French Academy, and adds to these lectures and the personal guidance and inspiration of the most advanced and able students from the other scientific institutions of the country. The new *conseil superieur*, composed of statesmen and professors of the highest standing, which has the chief control of the national system of education from primary school to university, might almost be described as a new educational academy, with vast administrative responsibilities.

“The remarkable new school for the post-graduate training in statesmanship, which, although a private institution, is training the political leaders of all parties; the new law of 1878, basing all clinical and practical medical studies upon the sciences which underlie them (chemistry and the various branches of biology); the Musée Guimet, which two years ago opened its extensive museums and libraries, and now offers facilities for the study of comparative religion un-

equalled in the world; the progressive decentralization and local organization of primary education (the sagacious policy of Minister Buisson); the development, by government and otherwise, of what may be called the pedagogy of high education; and the great fact that in fourteen years the total amount devoted to education in that country has increased sevenfold,—all this shows how far, in the words of a distinguished French statesman, ‘education is fast becoming the central question for France.’

“In Italy a council of education, composed of sixteen royal appointees and sixteen professors selected from the universities, has grappled with the problem of subordinating fourteen of its universities to the other seven, which latter are being rebuilt with great and sometimes literally palatial magnificence. As, with the policy of doubling for each provincial university all the funds it can raise for itself, the government has gradually acquired practical control of all of them, scholarly and scientific activity has been awakened to new life in nearly all directions, and ambitions of intellectual leadership, as in the best days of the mediæval universities of Italy, are often manifest.

“Holland has revised and co-ordinated her organizations of higher education, and established one new university. Sweden has profoundly reconstructed her educational system on a plan that might be called the most severely modern in the world, and Denmark is taking steps in the same direction. In 1884, Russia, after prolonged discussion, re-organized her universities. In Great Britain, new provincial universities, and important changes in the others, too many and great to be briefly described here, have been inaugurated. In Germany, thirteen magnificent university buildings make Strasburg, in all departments, the best of all architectural embodiments of the German university ideal. Halle and Kiel have been, and Breslau is now being, almost entirely rebuilt. New and often magnificent laboratories, libraries, special clinics, and museums at every seat of learning,—great temples of science, as they were called by one of its fervid orators, Du Bois-Reymond,—and two single buildings costing four million dollars each, show where much of the French indemnity money has gone; and, what is far more important, the internal has not lagged behind the external growth. At Budapesth, Ghent, Aix-la-Chapelle, Helsingfor in Finland, and even in remote Athens, magnificent new structures show in what esteem science is now held, and what still greater things she is yet expected to do. Several institutions of new pattern, like the Naples School of Zoölogy, which now trains the best professors for Germany; the London University, which is solely an examining body, and does not teach,—these and many more show not only how many and strong,

but how differentiated, institutions have become in the field of higher education.

"In my trip, information was sought from every source. Books, reports, and building-plans of many kinds were gathered. Ministers of education, heads of universities, and, above all, leading scientific men, were visited. The information and advice of the latter, always cheerfully given, and in not a few cases in detail and in writing, constitute by far the most valuable result of this trip, and will soon be reported on at greater length. Much of this advice was confidential, and involved personalities; some of it embodies long and fondly cherished ideals of great men, nowhere yet realized; but most of it represents the inner aims, methods, and ideals of the best existing institutions, like those named above, and others.

"The causes and the effects of all these movements and ideals in Europe have been felt in other lands. After long discussion, a new university, to which hundreds of Russian patriots with exiled friends have contributed money, household treasures, and even prayers and tears, was at last founded in Siberia, at Tomsk, and not at either of the chief military centres, where freedom would have been impossible. In Japan one of the most interesting universities in the world has been developed as the centre and instrument of most of the remarkable transformation in that country. In Australia and South America new and vigorous universities have been recently established.

"The new movement is already upon us in this country, and many significant facts show that the resultant interest and opportunity here have never been so great. All such facts and tendencies, and many more, opened a clear and broad field for us at Worcester, and unmistakably defined our work as follows:—

"1. It must be of the highest and most advanced grade, with special prominence given to original research. This our country chiefly lacks and needs for both its material and educational welfare. This is in the current of all the best tendencies in the best lands, and is the ideal to-day of, I believe, about every scientific man, who is able and in earnest, throughout the world. For this our location offers the rarest opportunities and inducements yet possible in this country.

"2. We must not attempt at once to cover the entire field of human knowledge, but must elect a group of related departments of fundamental importance, and concentrate all our care to make these the best possible. Each science has become so vast and manifold that it is impossible to cultivate the frontier of all at a single university. This is more and more recognized abroad, and is still more true under our American system of private endowment than on the European plan, with a national treasury to draw from. If coming universities, instead of supplementing others, will elect each its group of studies, all the gain in economy and effectiveness which skilled labor has over unskilled will be secured in the field of highest education.

"3. For our group we chose at first five fundamental and related sciences. Work in science can be quickest organized. Great libraries and museums, and every thing else that only age can bring, can be dispensed with at first, and a complete outfit of the best apparatus and of all needed books can be gathered in a short time. Again, this is a practical country, and its industries are sure to depend more and more on the

progress of science. So far, we have utilized science with extraordinary ingenuity in our inventions, but have done comparatively little to create or advance it. We desired to make a patriotic endeavor to develop American discoverers as well as inventors. Finally, and above all, science, with its modern methods, has become an unsurpassed school of discipline, culture, and reverence.

"4. We must seek the most talented and best trained young men. We must not exploit them, work them in a machine, nor retard their advancement, but we must give them every needed opportunity and incentive. As from hundreds of applicants we have admitted but a very few of the best students, because many would frustrate our plan, so, from the many subjects found in most large universities, we selected five to receive all our care, although later we hope to increase both.

"Mathematics is often called the queen of all the sciences. As the latter become exact, they approximate it, and are fructified by its spirit and its methods. Its antiquity, its disciplinary value, its rapid and recent development, make it obviously indispensable. Physics is the field of the most immediate application of mathematics, and deals with the fundamental forces of the world,—heat, sound, light, electricity,—and the underlying problems of form and motion generally, with their vast field of application in such sciences as astronomy and dynamic geology. Chemistry, with its great sudden development, revealing marvellous order and harmony in the constitution of matter, is rapidly extending its dominion over industrial processes. Biology, which seeks to fathom the laws of life, death, reproduction, and disease, that underlies all the medical sciences, in its broader aspects has taught man in recent decades far more concerning his origin and nature than all that was known before. Psychology, or the study of man's faculties and their education, is a new field into which all sciences are now bearing so many of their richest and best ideas, and now so full of promise of better things for the life of man. These five we must have, and nowhere is man brought so close to the primitive revelation of God in his works.

"We have thus sought in these departments the highest form of what is called the philosophical faculty, devoted to non-professional specialization. We are not a graduate department in which most so called graduate students attend, and most professors conduct undergraduate work. We are not an institution like the Smithsonian, which does no teaching; but our teaching is so ordered that it is a direct stimulus to research, and no one is so able and eager to teach the few fit as a discoverer. We are not an academy of sciences, but we have features of all these, and many more. This work is the most laborious and the most expensive. It is the most all-conditioning and the most central for any and every new departure. An undergraduate department, a medical school, a technical school, and, even still more, specialization in the existing departments, or new ones of any kind, could be developed from this basis with comparatively little labor, time, or expense. But the value of all professional or industrial schools depends on the vigor and dominion of the philosophical faculty, the heart of every true university, from which they derive their life and light, and where knowledge is pursued for its own sake, and for its culture effect on the investigator. We are a school

for professors, where leisure, method, and incentive train select men to higher and more productive efficiency than before.

"Last year college trustees elsewhere found a full half-dozen of our fellows only too attractive for their vacant chairs. But if we can thus relieve college trustees of the difficulties under which they sometimes succumb, in selecting suitable men for professorships, we can also ease them of the great expense of providing advanced courses, and from the temptation of retaining after graduation their best men, who could and should utilize larger opportunities.

"The work of the university began a year ago, in all its departments. During the first part of the year, the work of furnishing and equipment was carried on side by side with lectures and scientific work. Our nearly threescore men (selected in part only from about nine hundred applicants for various positions) included graduates of forty-eight different universities and colleges. The printed register describes the buildings, grounds, and organization of the faculty; the system of docents and fellowships; methods and courses of instruction; and the scientific and literary equipment of each department. During the year twenty-eight professors and other instructors have given thirty-three courses, attended often by other professors. This method of mutual instruction has proven a great and wholesome stimulus.

"In our methods of instruction, stated lectures, which are required by the vote of the trustees, are the smallest part. Elbow-teaching is given in the laboratory, and there is individual and constant guidance of reading, as well as experimentation, if needed or desired. Clubs, conferences, and seminaries are held, where all important literature in a wide field, and in different languages, is read; each man taking a subject, and reading and reporting for the benefit of others. Not only the information, but the insight, criticism, methods, and standpoint of each are pooled for the edification and stimulation of all. The contact between professor and student was never closer, and more avenues were never opened between minds working in the same place and field.

"The most important part of our work is research, and we wish soon to be ready to be chiefly judged by the value of our contributions to the sum of human knowledge. By the unanimous vote of the board of trustees, approved by a unanimous vote of the faculty, the leading consideration in all engagements, re-appointments, and promotions, must be the quality and quantity of successful investigation. This significant step gives us a unique character, and makes most of our problems new ones.

"It seems, and often is, a very simple and easy thing to take a free look at new facts. This kind of investigation may be made by any traveller or intelligent collector of specimens. It is sometimes harder to slightly vary the conditions in well-known fields, and note the concomitant variations in the result. Both these kinds of work are, in a sense, original research. Such are many of the theses for the doctor's degree, not to speak of those that are not published; so that the work of the professors and the students, and the standing of the university and the value of its degree, are unknown. Results must be had without risk of failure. Very different from and above this and all so-called 'analogy-work' are the investigations conducted by the aid of accom-

plished experts, who have already taken their doctor's degree, and give their entire time to co-operation with the professors. Of these we have had one or more in each experimental department during the year, and with excellent results, for investigation. Risks of negative results, often very important in themselves, must be freely taken, if results of great value are to be attained.

"It is impossible, in untechnical terms, to even speak of the researches undertaken here during the year, although these are the chief work of the university. New minerals in Arkansas, with a book on the petrography of that State; chemical action as affected by electricity in the field of a strong magnet; the crystal structure of isomorphous compounds; the ultimate atomic and molecular constitution of two widely different groups of chemical substances, which is said to establish new and important scientific conclusions; further developments of the non-euclidean geometry; several papers, said to be of great algebraic importance, on matrices; a standard of length in terms of a light-wave one fifty-thousandth of an inch long; a new method of greatly magnifying the power of telescopes, so that possibly the disks of fixed stars may be seen (a method speedily put in operation by the Lick Observatory, with the largest telescope glass in the world); the electrical properties of the air, and a little group of problems in meteorology; the embryology of an animal peculiar to America, and of great importance to the ancestry of vertebrate life; studies of sea-anemone and jelly-fishes; the breeding-habits and embryology of the lobster, strangely unknown before; a third fundamental tissue determined for most organs in the vertebrate body; the discovery of the innervation of veins; the comparative study of organs of taste in many vertebrates; fatigue, studied experimentally and also histologically, in the living cell; the brain of the world-known deaf-mute, Laura Bridgman, more thoroughly studied than any brain ever before has been; the time of the quickest mental and nerve processes; the sense of rhythm, so fundamental to several arts; the myths, customs, and beliefs of the native Indian tribes of British Columbia,—all of these and half a dozen more of less significance, some not yet completed, some already published in several languages, represent some of our work here during the past year, so important that if, instead of marking the beginning of a second year with greater facilities and increased numbers and zeal, this occasion marked the close of the university, the sum of human knowledge would have been larger for our having existed, and we should have our place forever in the history of the advancement of science.

"In addition to this, I do not here mention the marked stimulus we have already exerted on other institutions. In this new country we need new men, new measures, and occasionally new universities; and we, like England, have in later years experienced their amazing good. In the field of experimental science, unlike some other departments, what is there of importance, that a few centuries can afford, that cannot be at least as well provided in a few years? A new institution, in a time and place like the present, manned by young men, ought to become a new movement. Many of our problems are new in this country, and must be wrought out slowly and in the light of all available experience and wisdom.

"Partly to aid ourselves in this work, as well as for our

students, we attempt this year to begin to develop the pedagogy of higher education by a new department, and a new third journal, now about to be issued from the university.

"Finally, although we yet lack all the traditions and enthusiasm that come with age, with what gratitude and earnest felicitation does every mind and heart here turn to a founder who is not a tradition, a picture, a statue, or even a memory, but the living, animating power of the institution he has planted with such wisdom, and watered with such care! As an investigator toils to bless mankind with new discoveries, so he has wrought that the world might be blessed by the more rapid increase and diffusion of truth. As a teacher longs to impart all his knowledge to a favored pupil, so he has been the best of all my teachers in things in which a scholar may sometimes lack wisdom. As parents are anxious for the comfort and highest success of all their children, so he, and his devoted wife, could even be careless of what all others may say or do, if only every man here be so placed, furnished, and incited as to do the best work of which he is capable, for himself and for science. If we labor with his persistence and devotion, his care in things that are small as well as great, we cannot fail to realize his and all our highest hopes and best wishes for Clark University."

THE ARYAN CRADLE-LAND.¹

"It will be for the benefit of our science," said the president of the Anthropological Section of the British Association, "that speculations as to the origin and home of the Aryan family should be rife; but it will still more conduce to our eventual knowledge of this most interesting question if it be consistently borne in mind that they are but speculations." With the latter, no less than with the former opinion, I cordially agree. And as, in my address on the Aryan cradle-land in the Anthropological Section, I stated a greater variety of grounds in support of the hypothesis of origin in the Russian steppes than has been elsewhere set forth, I trust that I may be allowed briefly to formulate these reasons, and submit them to discussion.

(1) The Aryans, on our first historical knowledge of them, are in two widely separated centres,—Transoxiana and Thrace. To Transoxiana as a secondary centre of dispersion the eastern Aryans, and to Thrace as a secondary centre of dispersion the western Aryans, can, with more or less clear evidence or probable inference be traced, from about the fourteenth or perhaps fifteenth century B.C.; and the mid-region north-west of Transoxiana and north-east of Thrace—and which may be more definitely described as lying between the Caspian and the Euxine, the Ural and the Dnieper, and extending from the 45th to the 50th parallel of latitude—suggests itself as a probable primary centre of origin and dispersion.

(2) For the second set of facts to be considered reveal earlier white races, from which, if the Aryans originated in this region, they might naturally have descended as a hybrid variety. Such are the facts which connect the Finns of the north, the Khirgiz and Turkomans of the east, and the Alarodians of the south with that non-Semitic and non-Aryan white stock which has been called by some Allophyllian, but which, borrowing a term recently introduced into geology, may, I think, be preferably termed Archaian; and the facts which make it probable that these white races have from time immemorial met and mingled in the South Russian steppes. Nor, in this connection, must the facts be neglected which make great environmental changes probable in this region at a period possibly synchronous with that of Aryan origins.

(3) In the physical conditions of the steppes characterizing the region above defined, there were, and indeed are to this day, as has been especially shown by Dr. Schrader, the conditions neces-

sary for such pastoral tribes as their language shows that the Aryans primitively were; while in the regions between the Dnieper and the Carpathians, and between the Oxus and the Himalayas, the Aryans would, both in their south-western and south eastern migrations, be at once compelled and invited, by the physical conditions encountered, to pass at least partially from the pastoral into the agricultural stage.

(4) The Aryan languages present such indications of hybridity as would correspond with such racial intermixture as that supposed; and in the contemporary language of the Finnic groups Professor De Lacouperie thinks that we may detect survivals of a former language presenting affinities with the general characteristics of Aryan speech.

(5) A fifth set of verifying facts are such links of relationship between the various Aryan languages as geographically spoken in historical times,—such links of relationship as appear to postulate a common speech in that very area above indicated, and where an ancient Aryan language still survives along with primitive Aryan customs: for such a common speech would have one class of differentiations on the Asiatic, and another on the European side, caused by the diverse linguistic re-actions of conquered non-Aryan tribes on primitive Aryan speech, or the dialects of it already developed in those great river partitioned plains.

(6) A further set of verifying facts are to be found in those which lead us more and more to a theory of the derivative origin of the classic civilizations, both of the western and of the eastern Aryans. Just as between the Dnieper and the Carpathians, and between the Oxus and the Himalayas, there were such conditions as must have both compelled and invited to pass from the pastoral into a partially agricultural stage, so, in passing southward from each of these regions, the Aryans would come into contact with conditions at once compelling and inviting to pass into a yet higher stage of civilization. And in support of this all the facts may be adduced which are more and more compelling scholars to acknowledge that in pre-existing Oriental civilizations the sources are to be found, not only of the Hellenic and the Italic, but of the Iranian and the Indian civilizations.

(7) Finally, if the Hellenic civilization and mythology is thus to be mainly derived from a pre-existing Oriental or "Pelagian" civilization, it is either from such pre-existing civilizations, or from Aryans such as the Kelto Italiots, migrating northward and southward from Pelagian Thrace, that the civilization of western and northern Europe would, on this hypothesis, be traced: and a vast number of facts appear to make it more probable that the earlier civilization of northern Europe was derived from the south than that the earlier civilization of southern Europe was derived from the north.

The three conditions of a true solution of the problem either of Semitic or of Aryan origins appear to be these: first, the locality must be one in which such a new race could have ethnologically, and secondly philologically, arisen as a variety of the Archaian stock of white races; and, thirdly, it must be such as to make easily possible the historical facts of dispersion and early civilization. And I venture to submit the above sets of facts as not inadequately, perhaps, supporting the South Russian "speculation as to the origin and home of the Aryan family."

J. S. STUART GLENNIE.

ETHER INTOXICATION.

WE can bear out from personal observation, says the *Lancet* for Sept. 20 editorially, many of the statements which are now going the round of the public press in reference to the habit of ether-drinking in some parts of Ulster; for, in fact, some of the paragraphs are nothing more than copies of what have been reported in years gone by. The practice came into use about the year 1841-42, and was at first a kind of re-action against the great temperance movement which had been inaugurated by Father Mathew. Ether, at that time of the ethylic type, probably not very pure, was substituted for whiskey; and the habit, commencing in or near Drapers Town and spreading over a small surrounding area, is continued up to the present day. The order of drinking, as witnessed during a visit to the district named, is singular. The

¹ From *Nature* of Oct. 2.

ether purchased at open shops and at stores was doled out in wine-glasses. The drinker first washed out his mouth with a draught of cold water, and after that tossed off a wine-glassful of ether "nate," as it was said, drinking it quickly, almost at a gulp. Both men and women took part in this indulgence, and were speedily brought into a state of intoxication more or less complete. The intoxication differs from that produced by alcohol. It is more rapidly induced, and more rapidly dispelled; in fact, the effect of one dose may be developed and cleared off in a quarter of an hour or twenty minutes. The delirium is sharp; the stupor, for a brief period, deep; and the excitement, so long as it lasts, hysterical.

Particulars were gathered from a trustworthy medical source of several instances in which the narcotism caused by the ether had proved dangerous, calling for the employment of artificial respiration; and evidence was found of four actually fatal intoxications, either from an excessive dose, or from asphyxia caused by the entrance of some of the fluid into the glottis, with succeeding spasm or obstruction. It was gathered, at the same time, that tolerance to the effects of ether was much less marked than tolerance to alcohol; and that organic disease from the habitual taking of ether was exceedingly small compared with the ravages and degenerations which alcohol leaves in its train. The explanation of these facts is not difficult: alcohol is so soluble that it enters the blood freely; pervades, with the water of the blood, all the tissues; and is readily retained by them to work out those serious osmotic changes which demonstrate its action as the most potent of degenerators. Ether, on the other hand, is comparatively insoluble; and as it boils at the temperature of the body, and is diffused nearly as fast as it is introduced, it leaves few marks of mischief, except when it destroys life directly. Occasionally it gives rise to dyspepsia and to gastric irritation, with free eructations of gases mixed with ethereal vapor. But these symptoms belong to ether toppers of a hardened sort, and soon pass off when the habit is abandoned.

Of late years the use of the cheaper methylated ether has taken the place, to a considerable extent, of the ethylic variety, and some think with more injurious effects; but on this point there is no evidence strictly trustworthy. Officers of the government have at various periods made inquiries in order to see if, by legislative action, the habit could be controlled or prevented; but as yet nothing has been suggested that has promised success, and the excise officers are helpless, inasmuch as the spirit from which the ether is made has paid the usual duty previously to the manufacture.

HEALTH MATTERS.

Leprosy in Spain.

SOME interesting particulars are given by the British consul at Cadiz, in his last report, as to the San Lazaro Leper Hospital, which has been in existence at Seville for over six hundred years, says the *British Medical Journal*. The first leper-house in Spain was founded at Valencia, in 1067. The San Lazaro Hospital was founded by Ferdinand III., when he took Seville from the Moors, in 1248. It is situated about a mile to the north of the city. A decree was issued in 1478, confirming previous enactments to the same effect: "That all persons without distinction residing within the Archbishopric of Seville and the Bishopric of Cadiz, denounced and declared lepers, must go to the Hospital de San Lazaro, Seville." This decree was carried out with great rigor. From the reign of Alfonso X., down to the last century, it was the custom for four patients to visit Seville daily on horse-back, begging; and, as they were not allowed to speak to ordinary persons, they attracted attention by means of boards. In 1854 the hospital was put under the charge of the Diputacion Provincial: the edifice was then little better than a ruin, and contained only 29 patients. In 1864 the building was repaired. The patients, who number on the average from 30 to 36, are looked after by sisters of charity. From the official reports it appears that the patients are not all lepers, cases of cancer and other diseases being admitted.

Cremation at Milan.

Two systems of cremation are followed at Milan, by one of which the body is burned in a furnace surrounded by wood and charcoal, while by the other the combustion is brought about through a number of jets of gas which cast their heat upon the furnace from all sides. When wood and charcoal are employed, as stated in the *Medical Record*, about six hundred pounds of wood and one of charcoal are found necessary, and the process lasts two hours. When gas is used, all that is consumable in the body is burned up in less than fifty minutes. The body may, in ordinary cases, be introduced into the furnace with or without the coffin; but, if death has been caused by some infectious disease, the coffin and body must be burned together. The weight of the remains after cremation, in the form of bones and dust, is about four pounds. They are in color pure white, tinged here and there with a delicate pink; and it is a rule never to touch them with the hand. The bones, and vestiges of bones (which are for the most part burned into powder), are taken up with silver tongs, while the ashes are removed from the furnace with a silver shovel, to be placed on a silver dish, and then deposited in an urn for retention in the cinerarium. Here the ashes are preserved in separate compartments, each with a suitable inscription beneath it. The cost of cremation is five dollars to a member of the Society for Extending Cremation in Italy, or ten dollars in the case of non-members.

Child Suicides.

The *Medical and Surgical Reporter* is authority for the statement that from Jan. 1 to Sept. 1, 1890, 62 children—46 boys and 16 girls—committed suicide in Berlin. Of this number, 24 had attained the age of fifteen, 14 their fourteenth year, 9 their thirteenth, while 7 were only twelve years of age, and one had not attained the age of seven. In most of the cases the immediate cause for the act remains a secret, but it is supposed to have been due to exceptional severity on the part of servants or teachers.

Malarious Africa.

Malarial-fever is the one sad certainty which every African traveller must face. For months he may escape, but its finger is upon him; and well for him if he has a friend near when it finally overtakes him. It is preceded for weeks, or even for a month or two, by unaccountable irritability, depression, and weariness, says Drummond in his well-known book. This goes on day after day till the crash comes,—first cold and pain, then heat and pain, then every kind of pain and every degree of heat, then delirium, then the life-and-death struggle. He rises, if he does rise, a shadow, and slowly accumulates strength for the next attack, which he knows too well will not disappoint him. No one has ever yet got to the bottom of African fever. Its geographical distribution is still unmapped, but generally it prevails over the whole east and west coasts within the tropical limit, along all the river-courses, on the shores of the inland lakes, and in all low-lying and marshy districts. The higher plateaus, presumably, are comparatively free from it; but, in order to reach these, malarious districts of greater or smaller area have to be traversed. There the system becomes saturated with fever, which often develops long after the infected region is left behind. The really appalling mortality of Europeans is a fact with which all who have any idea of casting in their lot with Africa should seriously reckon. None but those who have been on the spot, or have followed closely the inner history of African exploration and missionary work, can appreciate the gravity of the situation. The malaria spares no man; the strong fall as the weak; no number of precautions can provide against it; no kind of care can do more than make the attacks less frequent; no prediction can be made beforehand as to which regions are haunted by it and which are safe. It is not the least ghastly feature of this invisible plague that the only known scientific test for it at present is a human life. That test has been applied in the Kongo region already with a recklessness which the sober judgment can only characterize as criminal. It is a small matter that men should throw away their lives, in hundreds if need be, for a holy cause; but it is not a small matter that man after man, in long and in fatal succession, should seek to overleap

what is plainly a barrier of nature. And science has a duty in pointing out that no devotion or enthusiasm can give any man a charmed life, and that those who work for the highest ends will best attain them in humble obedience to the common laws. Transcendentally this may be denied; the warning finger may be despised as the hand of the coward and the profane: but the fact remains,—the fact of an awful chain of English graves stretching across Africa.

Hairs as Records of Emotional Disturbances.

Dr. Pineus of Berlin claims to be able, by the aid of the polariscope, to detect certain traces of past emotions in the hairs. He explains, that, under the influence of mental disturbances of a violent kind, the hairs become decolorized at the junction of the lower two thirds with the upper third, reckoning from the surface of the skin to the root of the hairs. The observation, if exact, is interesting, but the recollection of such emotions is generally too vivid to render any artificial aid to memory necessary. If Dr. Pineus could only devise a means of detecting emotions to come, says the *Medical Press*, his *procédé* would excite a vast deal more curiosity.

NOTES AND NEWS.

IN the course of an article on recent progress in Egypt, the *London Times* says, "Both Egyptians and English are now alive to the need of educational progress. The people are no longer apathetic, as they were in the days of Mehemet Ali, who collected his pupils by force as he did his conscripts, and only kept them together by giving them food, lodging, clothing, and a monthly money payment of considerable value. Parents no longer believe the Koran contains every thing, or, rather, that what it does not contain is worth nothing. They are not yet alive to the advantages of trade or handicrafts, but they are fully alive to the advantages of government employment; and even in the villages a better class of education is urgently demanded. But want of funds stops the way. A general system of sound elementary education throughout the country would be one of the greatest blessings the English could confer; but it would cost money, and it cannot be done. All attention is concentrated on the higher schools in the big towns and in Cairo. You might as well try to build a pyramid without a base. Then, again, there are no teachers to teach the pupils. Inspection of such teaching as there is, and the establishment of normal schools for the training of the teachers of the future, are sadly wanted. Although the obvious duty of the English is to produce a class of Egyptian teachers, still the higher schools must remain for some time in the hands of professors from Europe. The educational system does not look so bad on paper. There are over 7,000 schools in the country, and 7,764 teachers; but the teaching is miserable, and out of a population of nearly 7,000,000 of people, only 200,000 can read and write."

—In Austria there is not only a high school of agriculture, costing the state 125,000 florins a year, but there are fifteen intermediate and eighty-three primary agricultural schools, besides nine chairs of agriculture in polytechnic establishments and agricultural experiment stations. Moreover, as stated in the *London Educational Times*, there are 162 courses of agricultural lectures, attended, on an average, by about 10,000 persons a year. The whole expense of agricultural subventions is set down in the Austrian Estimates for the present year as 1,777,034 florins.

—At a meeting of the International Meteorological Congress, held in Paris last September, the Rev. Father Denza read a paper on "The Decrease of Temperature in the Vertical Line." According to the figures he produced, the annual mean ascent required to obtain a decrease of one degree of temperature was 150 metres in the valley of Aosta, and 191 at Moncalieri (Monte Cenis), while 192 was the mean for the whole of Italy. At Pike's Peak, Colorado, 159 metres is the height required. In the winter months the heights in the valley of Aosta and at Moncalieri are 189 and 375 respectively, and 289 is the mean for Italy. It frequently happens that the temperature rises until a certain height is reached, and then decreases. This was particularly noticeable in January, 1887, when the temperature increased up to 700 metres (at out 2,200

feet), and then diminished according to the ordinary law. The barometric pressure was high, the air dry and calm. This phenomenon was confirmed by observations referred to by other members of the congress, and Père Dechevrens pointed out the necessity of taking the barometric pressure into account in comparing changes of temperature in the vertical. In China, at an observatory situated on a mountain in the midst of a vast plain, a rise of ten degrees of temperature is always observed for a fall of 20 millimetres in barometric pressure; and at Mount Washington, when the wind blows at the rate of 100 miles an hour, the variation of the temperature is thirty degrees for the same decrease of pressure.

—In the Teachers' School of Science of the Boston Society of Natural History, Dr. J. Walter Fewkes will give a series of ten lessons (Lowell free courses) during the winter of 1890-91, "On Common Marine Animals from Massachusetts Bay." The general scope of this course will embrace the ordinary marine animals of New England. It is intended to give special attention to the mode of life, differences in external forms, local distribution, habitats, methods and proper time to collect the eggs, young, and adults. The anatomy, embryology, and morphology of the species considered will be dealt with incidentally, wherever these branches of research can be used advantageously. The introductory lecture will give an outline of the course. The relative abundance of species and individuals, local causes which influence distribution, the rocky or sandy nature of the shores and their characteristic faunæ, and the influence of depth of water, tides, and temperature, will be considered. The relations and boundaries of the marine fauna of New England will be treated of under the following headings: comparison of the fauna of Massachusetts Bay with that of Narragansett Bay and the Bay of Fundy, and causes of the differences observed; pelagic animals; littoral and shallow-water genera; introduced and indigenous marine animals; marine animals which inhabit both brackish and fresh water. In the remaining lessons the principles discussed in the first lesson will be applied to the life histories of various characteristic species among the lower forms of marine animals. The course will be illustrated as far as possible. For further information address the secretary of the Boston Society of Natural History.

—Writing to *Nature* on the subject of sonorous sand, Mr. Henry C. Hyndman asks whether Professor H. C. Bolton is aware of an inland locality in South Africa, where, it is stated, the sands are sonorous. In a recent letter to the *Scotsman*, Mr. Hyndman mentioned that he had come across a paragraph in a work entitled "Twenty-five Years in an African Wagon," by Andrew A. Anderson, published in 1887, in which the author said, "Before leaving this part of the Griqualand West, I should like to describe that peculiar sand formation on the west side of the Langberg Mountain, which is in fact part of it. I heard from many of the Griquas and Potgieter living near it, that the lofty hills are constantly changing; that is, the sand-hills, 500 and 600 feet in height, in the course of a few years subside, and other sand-hills are formed where before it was level ground." And then in a footnote it is added, "I regret very much that the description of this sand formation has been left out, it being the only extraordinary geological formation known in Africa, and fully describes the musical sand."

—A means of easy intercommunication between writers, editors, and publishers has long been needed. To supply this need, the editor of *The Writer*, the Boston magazine for literary workers, has undertaken to compile a "Directory of American Writers, Editors, and Publishers," which will be published at the earliest possible day. No charge whatever will be made for the insertion of names and addresses in this directory, the usefulness of which, particularly to editors and publishers who wish to communicate with writers, will be evident at a glance. The desire of the editor is to make the directory as nearly complete as possible, but the army of minor writers is so great that it will be necessary to limit the number of addresses in some reasonable way. It has been thought best, therefore, to include in the first edition only the names of writers who have had a contribution printed in some one of the leading magazines or weekly periodicals during the last five years, or who have had a book published within the

last ten years. Writers who are included in either of these classes are requested to send at once to the editor of *The Writer*, P. O. Box 1905, Boston, Mass., the following items of information: (1) name of writer; (2) present residence; (3) permanent business address; (4) literary specialty; (5) titles of principal articles or books printed, and dates of publication. This information should be sent promptly, for the directory has been for some time in preparation, and its publication will not be long delayed. The editor of the directory will be obliged, if, in addition, writers will send on a separate sheet, not for publication in the directory, autobiographical particulars, including date of birth, place of birth, parents' names, date of marriage, name of husband or wife, successive places of residence, title and date of first work printed, list of later works, and other such matters as would be suitable for publication in a "Biographical Dictionary of American Authors," now in course of preparation. By the prompt co-operation of those who are interested in the matter, the early publication of the directory may be secured.

—Mr. John E. Nowers of Burton-on-Trent writes as follows on the tenacity of life in a cat, in *Hardwicke's Science Gossip* for October: "A very severe accident to a cat came under my notice about two years ago. The cat was in the habit of catching mice under a machine for lowering casks into a brewery cellar. One evening it was working, and the first hogshead of ale was rolled on and lowered. When it reached the bottom, the screams of an animal attracted the attention of the man. He looked, and found the cat was trapped between the edge of the cage and the floor. She was caught across the loins, and had to remain in that position until he called another man to help him up-end the hogshead. If he had rolled it off, it would have smashed the cat to atoms, as its weight was about six hundredweight. When the cat was released, she crawled away, and they could not find her again that night. Next morning she was found in the cellar alive, and brought up to me. I examined her, and could not find any bones broken, but she could hardly move. I decided not to kill her, but try and bring her round, so made a bed in a warm corner of the engine-room. She lay there for three or four days in a very weak and bad state. In about a week she had three dead kittens, and then began to recover rapidly. For a few weeks she could only limp a short distance from her bed. She is still alive, and no one would notice by her appearance that she had ever been so badly hurt. Since that time she has had about eight kittens. She is very quick in all her movements, and a very keen mouser. When I read the note on the same subject in *Science Gossip* for July, I thought the above might interest some of your readers."

—The monthly report of Arthur Winslow, State geologist of Missouri, shows that during the month of September detailed mapping has progressed uninterruptedly in the coal-fields in Randolph, Chariton, Howard, and Johnson Counties, and in the south-east in St. François and Iron Counties. About a hundred and fifty square miles have been covered. The examination of the clays and structural materials of Kansas City and of the tributary country was begun about the middle of the month, and work has been done in both Jackson and Henry Counties. There are in and about Kansas City some thirty-two works engaged in the manufacture of clay products, and from fifteen to twenty quarries. The country about this city, including Henry and other counties, has valuable deposits of clays and other structural materials which are supplied to Kansas City and other points; hence, from Kansas City as a centre, will properly be made an examination of a large portion of western central Missouri. In connection with this line of work, inspections have further been made of clay deposits and works in Callaway and Audrain Counties. The examination of the mineral waters of the State has been actively pushed in the field during the past month. About thirty localities have been visited, and some twenty samples for analysis have been collected from the following sixteen counties: Monroe, Audrain, Callaway, Boone, Howard, Randolph, Livingston, Worth, Gentry, Nodaway, Buchanan, Platte, Clinton, Clay, Adair, and Jackson. As this work progresses, the importance of the subject is constantly developing. A very large amount of capital has been invested in improvements at numerous

of these springs in the State, and many of them have a large patronage. There is evidence that the waters at many places are of decided therapeutic value, though a determination of their compositions is necessary to fully substantiate this. Paleontologic work has been in progress in Henry, St. Clair, Polk, and Greene Counties, and large additions have been made to the collections of the survey, besides what has been gathered for study through the co-operation of the United States Geological Survey. During the latter half of the month, work has been done in classifying, labeling, and arranging specimens for exhibition in the cabinet of the survey. Besides this systematic work, inspections for special purposes have been made in Camden, Laclede, St. Clair, Randolph, and Callaway Counties. The work in the coal-fields has already progressed far enough for it to be apparent that the coal-lands at present under development represent only a small portion of the whole, and that many farms and other lands contain beds which should prove valuable possessions to their owners. These lands offer a promising field for investment; and that this fact is appreciated by those who have knowledge of the ground, is evidenced by the extent to which such lands in some sections are passing into the control of investors and companies.

—The Manchester (England) Steam Users' Association has issued a report on a series of experiments made with a view of ascertaining the result of injecting feed-water into a boiler when the boiler is short of water, and the furnace is red-hot. It has for long been a common belief among engineers that many boiler explosions are due to this cause; and to the same cause have been attributed accidents to domestic circulating boilers which have been allowed to run dry, and have then had cold feed-water admitted. The correctness of this belief has, however, for some time been doubted, and the elaborate series of experiments recorded in this report go to prove that it is altogether erroneous. As described in the *Journal of the Society of Arts*, London, a Lancashire boiler 27 feet long was fitted up for the purpose of the experiments, so that the condition which it was desired to investigate could be reproduced, while observations could be taken of what was going on within the boiler. These experiments were by no means free from danger, and an observatory had to be constructed near the boiler. As a result, it was found that the sudden injection of the cold feed did not cause a rapid generation of steam, and a sudden violent pressure which the boiler in its weakened condition could not stand. In some cases, indeed, the pressure was slightly raised; but it always fell immediately afterwards, and in some cases the cold feed at once lowered the pressure. The writers of the report even think that it might be advantageous in cases where the water has been allowed to get very low, and the furnace-crowns to become heated, to turn on the feed, though they hesitate, in the present state of knowledge on the subject, to recommend such a proceeding.

—The London *Times* prints statistics, compiled by the Lyons syndicate of silk merchants, respecting the production of silk in the world last year. The figures are, of course, merely approximate, for the results of the harvest in the interior of China, Japan, India, Persia, and the Caucasus, cannot be absolutely estimated. If it were possible to get the exact figures of the production in these comparatively unknown regions, it is not an exaggeration to say that the general silk-production of the world would be found to be double what the figures show it to be now. The syndicate has no interest in securing definite information concerning these remote districts. It is sufficient for commercial purposes to obtain the returns of the European harvests, and those districts of the Far East which supply European and American manufacturers. The syndicate estimates the general production of silk in 1889 at 11,706,000 kilos. For the previous four years the figures were as follows: 1888, 11,548,000 kilos; 1887, 11,888,000 kilos; 1886, 10,554,000 kilos; and 1885, 9,002,000 kilos. The average of the four years 1885 to 1888 being 10,748,000 kilos, it will be seen that the production of 1889 considerably exceeds the average. This result has been obtained notwithstanding the deficiency in the European harvests, owing to the improvement in the Levant district, notably Syria, and especially in the larger Asiatic arrivals.

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

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LETTERS TO THE EDITOR.

. Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

Espy's Experiments.

PROFESSOR FERREL's letter in *Science* of Oct. 3 emphasizes some of the points that I have insisted upon in regard to the distinction which should be made between meteorologic facts and theories. Professor Ferrel clearly sets forth the fact that such theories depend upon "physical constants," such as "the mechanical equivalent of a unit of heat, the specific heat of air, the latent heat of aqueous vapor, the tension of the aqueous vapor of saturated air at any given temperature," etc. I have tried to show that starting from such facts, and elaborating a theory which shall account for such complex motions as we meet with in our storms, is certainly very interesting; we do not agree, however, as to whether it is profitable or not. That the results of Espy's experiments do not enter into modern theories will be a surprise to some, I think. I have tried to show that no one, so far as I knew, had tried Espy's experiments or shown that they could be applied to storm conditions as they are now familiar to us. Of course, a score of physicists, more or less, have theorized upon the subject.

May I suggest that I have never contended that latent heat is not set free on condensation of moisture? My whole effort has

been to determine the sufficiency of Espy's experiments in establishing the view that there is an uprush of air in our storms, which is increased by the liberation of latent heat from condensation, etc. It seems to me that if all other views regarding his researches prove faulty, the single fact that he used an expansion which was equivalent at times to a rush of air at ten thousand feet per second,—an absolutely incredible velocity for our uprushes,—would be well-nigh fatal to his deductions. In repeating Espy's work, I simply attempted to carry on a research which should in some measure be comparable with natural phenomena. Expansions at the rate of five hundred and a thousand feet per second are certainly far greater than any that we can consider as occurring in our storms. I hope shortly to repeat my experiments with improved apparatus, and determine, if possible, a few points in Espy's work that are not quite plain. Professor Ferrel himself shows that these very researches of Espy were faulty, and this corroborates in some measure my results.

Finally, Professor Ferrel calls attention to the deduction that I have made, that compressing air ten inches, without the loss of heat, would heat it 163°, and gives 43° as the true temperature. My deduction was based upon the facts presented by Professor Tyndall on the sixty-sixth page of "Heat as a Mode of Motion." I find I have mistaken Tyndall's meaning. This computation does not seem very simple. One of my friends, a physicist, gives me a very different value from Professor Ferrel's. The simplest computation would be in the case of a cooling after a compression, and after the compressed air has attained the outside temperature. I feel sure, that, if Professor Ferrel will make that computation, he will see at once that his temperature of 45° cannot be correct. The problem seems quite complex, and I would be very glad to have some one familiar with such problems work out a solution. The problem is this: What will be the rise in temperature in a mass of air at atmospheric pressure if its pressure is increased without the loss of any heat: the increase of ten inches to be considered after the air has cooled to its initial temperature? May I call Professor Ferrel's attention to a single point which he seems to have overlooked, or regarded of little importance? It is this: if we consider that Espy, after compressing the air, waited until it attained the outside temperature before explosion, the resultant cooling after expansion cannot be compared in any way directly with the heating produced by compression and without the loss of heat. Moreover, it is impossible to determine, by Espy's work, the amount of the previous heating, from the cooling after explosion.

H. A. HAZEN.

Washington, Oct. 4.

Deaf-Mutes and their Instruction.

By a deaf-mute is understood one who is born deaf, or lost his hearing before the acquisition of speech, and in consequence thereof is mute. Deafness may be divided into two classes; viz., congenital and acquired. Acquired deafness admits of four subdivisions:—

A. Where hearing has been lost before the acquisition of speech.

B. Where vowel hearing alone is retained.

C. Where the hearing has been lost after the acquisition of speech, but the latter imperfectly retained.

D. Where the hearing has been lost and speech retained, but the individual lacking education, and precluded from training in common with hearing children.

Those described under C and D are designated as "semi-mutes." Over fifty per cent of the total number of deaf-mutes are of the acquired form. Children who lose their hearing at the age of three or four years are apt to forget speech within about a year's time, unless intelligent parents endeavor to retain and cultivate it. The hearing is more essential to intellectual development and enjoyment than any other sense. Without education, a deaf-mute is entirely debarred from the acquisition of spoken language, the noblest product of the mind. It is true, necessity, the mother of invention, impels one thus affected to invent a language of natural signs to communicate with his fellow-beings; but he is not enabled to express or receive abstract ideas through this medium.

Intercourse under these circumstances is necessarily limited. The absence of hearing power makes the individual more dependent upon his other senses, which consequently acquire a high degree of development and acuity by constant practice. Sight, touch, and general sensation take the place of the lacking sense, in addition to performing their inherent physiological functions, in the acquisition of mental training and knowledge. Observers will note that the gaze of the deaf-mute wanders from object to object, interrogating them as to their significance. The conclusion drawn from such an inspection depends for correctness upon the reasoning faculties and intellectual vigor of the individual. In general, the uneducated deaf-mutes recognize a difference between right and wrong; not the moral right and wrong in the full sense of the expression, but sufficient to enable them to evade coming in conflict with the law. They are able to perform mechanical labor, and try to make themselves useful. In earlier times, when they were not recognized as responsible beings, they were sometimes employed at services where secrecy was desirable, as the law did not recognize them as witnesses, even in their own behalf. As a consequence of frequent misunderstandings with their fellow-beings, they are apt to become quick-tempered. Some drag and shuffle their feet in walking,—a habit due to their infirmity and the want of education. The general sensation of deaf-mutes is very acute; and it is very seldom that we hear of a deaf-mute being run over by vehicles, or meeting with kindred accidents, in this great metropolis. Their manners, morals, and understanding will depend largely upon their associates. Despite the fact that uneducated deaf-mutes have given evidence of a high order of intelligence, they were not recognized as rational beings by the ancients, and were classed with idiots. Our progenitors did not understand the connection between hearing, speech, and thought; and the deaf-mutes were denied the capacity of intellectual culture, and were allowed to remain in a deplorable state of ignorance. The first intimation to be found regarding the instruction of this unfortunate class occurs in Rudolph Agricola's works, "*De Inventionem Dialecticæ*." This writer flourished during the close of the fifteenth century. He relates the case of a deaf-mute who could converse by writing. From the sixteenth to the seventeenth century quite a number of cases of deaf-mutes who were educated individually are recorded, some by means of the sign-language, and others by articulation. J. P. Bonnet taught deaf-mutes by articulation, and published his method at Madrid in 1620.

The credit for establishing the first school for deaf-mutes belongs to De l'Epée. This school, established at Paris in 1760, became a state institution in 1791. While this was a momentous step forward in the history of deaf-mutism, the founder unfortunately made the sign-language the basis of his instruction. His idea was, that spoken language is foreign to the deaf-mute, because he cannot acquire it through the same channel as we do (by hearing), and that his natural language is one of signs, because he uses them; and therefore De l'Epée's system develops from the natural signs, which necessity compels the deaf-mute to use, an artificial sign-language, which has no analogy in construction with spoken language, and imparts to the deaf-mute all information in that artificial sign-language, and makes the acquisition of his native language a secondary achievement, as we, for instance, learn a foreign language by means of our mother-tongue.

In 1778, Heinricke opened a school for deaf-mutes in Leipzig, and made articulation the basis of instruction. Since that time these two systems have been in vogue, and are designated, after their origin, the French and the German system respectively. The German system approaches in principle to the method of nature. A child is made to acquire language by frequent representation of the word to its mind through the sense of hearing. To overcome this obstacle in the deaf child, the word is exhibited to him through the sense of sight, and in a twofold manner,—by articulation and by writing. The word is thus ingrafted upon the mind by two impressions without the intervention of any artificial signs. As a consequence, those taught by articulation share as fully in the possession of a mother-tongue as their more fortunate brethren, excepting that this end is obtained at a somewhat later period in life. They employ it in reflection; and it is

the language they dream in (they speak in their dreams as normal individuals), for they are unacquainted with any other. Those taught by signs reflect by means of signs, and translate their impressions into our language when necessity compels them to. Even De l'Epée acknowledges this latter fact.¹ For the benefit of those who are unacquainted with the method of teaching deaf-mutes to speak, I will give a brief illustration. The easiest sounds to begin with are the vowels *a*, *o*, *u* (*a* as in *father*, *o* as in *hold*, and *u* as in *flute*). The teacher writes the letter *a* on the black-board, and the child copies it. The pupil then places his hand on the teacher's chest while the latter is in the act of pronouncing the letter. By this means the pupil feels the expiratory thrill caused by the articulation of the letter, and will further note that the tongue lies flatly upon the floor of the oral cavity, and that the mouth is open. The child will have very little difficulty in pronouncing the letter; it may occasionally be necessary to depress his tongue once or twice. The pupil is then caused to place his hand upon his own chest, and repeats the letter. By feeling the vibration, he becomes conscious of the fact that he has accomplished the feat. The letters *o* and *u* are pronounced with visible modifications of the position of the lips.

In *m* the lips are slightly closed, and the air passes in a vibration through the nose. By placing the forefinger of the pupil against the nostril, he will feel the letter as it is pronounced. After a few attempts, he will readily succeed in enunciating the letter himself. In *f* the tip of the tongue rests against the upper part of the lower gum; the upper teeth rest lightly upon the lower lip; and the lips are lightly closed excepting at the centre, where a small opening is preserved, through which the air hisses. If the pupil holds the back of the hand a little distance from the mouth, he will feel the letter as it is pronounced. He will easily learn to pronounce the letter after one or two endeavors. By holding his hand before his own mouth, he perceives whether he pronounces the letter correctly or not. In *v* the upper teeth rest lightly against the lower lip, and the air passes through them. By holding the back of his hand under the chin, the pupil will again feel the letter pronounced. In *s* the tip of the tongue rests against the upper gum, the teeth are closed, and the air hisses through them. The pupil will learn to pronounce the letter at the first attempt.

Now, some may consider this to be a very slow process, which exhausts the patience of both teacher and child; but let me say, as one familiar with the subject, that this is not the case. With a little experience on the part of the teacher, a class of ten or twelve congenital mutes of ordinary intelligence will acquire the entire alphabet within ten or twelve weeks, and will be able to read from the lips, and speak and write such monosyllabic words as "book," "fan," "hand," "mouth," "cap," "fish," "hat," "house," "cup," "man," etc. At the expiration of the first year they will be able to make use of simple sentences. Even though the voice of some congenital mutes may not be as pleasant as that of others, the labor expended is not lost; for such have the advantage, first, of being able to read from the lips whatever is spoken; and, second, the value of the impression which has been made upon the mind by articulating the word. I need scarcely say that all this is more readily acquired by semi-mutes, and that their voices sound more pleasantly to the ear. We should, moreover, consider the injustice which has been and is now practised against the semi-mutes, and they constitute a large percentage. By those schools which make use of the sign-language, they are classed with congenital mutes, who employ only signs in communicating with one another, and naturally the former do not find opportunity for retaining what speech they may have possessed. Sometimes even the teacher is a mute. Under these circumstances, and as if designedly, the semi-mute is bound to forget speech, especially after he has acquired the sign-language; and finally he becomes so imbued with muteness, that he actually becomes ashamed to use his voice. I have had the opportunity of observing the effect produced upon semi-mutes, when brought to an institution where signs were used. For a while they could not recover from their bewilderment and confusion when they,

¹ See my article on "Deaf-Mutism: Its Pathology, Causes, and Treatment," in the New York Medical Record, Nov. 3, 1888.

viewed their surroundings, and noted the inmates making faces, throwing their hands and arms up and down, forwards and sideways, and they themselves utterly oblivious to the meaning of these pantomimes. The effect is as if a sane man were suddenly put amidst a crowd of lunatics. Several highly educated teachers, who were connected with a school for deaf-mutes where signs were used, acknowledged to me the fact that there has never been a congenital deaf-mute educated in this country by the sign-language who could use the English language correctly. All those who are paraded at exhibitions are semi-mutes, who had a fair knowledge of language when they were brought to school. If those advocates of the sign-language who claim that a succession of gifted and philosophic men have improved the methods of educating deaf-mutes would only have retained and cultivated the speech of the semi-mutes intrusted to their care, they would have merited claim for earnestness and sincerity of purpose; but these are, and always have been, the very ones to fiercely combat every honest attempt to improve the mental condition of this unfortunate class. A very able opponent of the sign language very truly said, "Different views may be harmonized, but different motives never." The sign-language obtained a foothold in this country merely through accident. Its exponents have sprung from one family here, who are so deeply indoctrinated with the fallacious cult, that self-interest and obstinacy prompt them to make a combined stand against reform. Nevertheless, since the Institution for the Improved Instruction of Deaf-Mutes in this city, and the Clark Institution at Northampton, Mass., came into existence (now a matter of over twenty years), where all the branches of an education are imparted in articulated speech with success, the sign-language began to decline. It is true, it dies hard; but the sooner this end is obtained, the better it will be for all concerned. Rest to its ashes!

In the "Reference Handbook of the Medical Sciences," Professor E. M. Gallaudet, Ph.D., LL.D., contributed an article on the language of signs and the combined systems of instructing the deaf-mutes. The greater part of the article is devoted to demonstrating the fact that such a thing as a sign-language really exists, and contains historical notes and narratives, evidently cited with a view to proving its origin and varying fortunes. Remarkable! The learned professor might be surprised to find, on consulting any competent lexicon, that there exists, besides, a language expressed with the eyes, one with flowers, one by means of music. The click of the telegraph-instrument is a most useful mode of communication. Thieves use a language expressed with the fingers, eyes, and feet, etc. All of them have been and are made use of by hearing people with more or less utility and practicability. But articulate speech is pre-eminently the language of the human race, alike for the hearing and the deaf. The various substitutes which human ingenuity has invented are the outcome of peculiar circumstances. The hearing child makes use of gestures before it acquires speech, as a matter of necessity; the intelligence of the child determines the expressive value of the gesture; and the same is true of the deaf-mutes. In summing up the advantages of the combined system, the writer says,—

"The experience of nearly a century and a half of practical instruction of the deaf has established no conclusion more clearly than that it is impossible to teach all deaf-mutes to speak. Some are found to be lacking more or less in mental capacity; some have only a weak and inefficient imitative faculty; with others an infirmity of vision is discovered; others, again, have little quickness of tactile perception."

It may have taken some specially constituted instructors to come to such a conclusion; it may be said with equal justice that "a century and a half of experience" has proven conclusively that it is impossible to teach all hearing children to speak or to write correctly or intelligently. Any intelligent layman knows that a lame child may also be near-sighted, and that one thus afflicted will make neither a good foot-racer nor an expert hunter. All hearing people are surely not on the same plane of intellectual, physical, and moral vigor; for, if they were, such inadequate means of instructing the deaf as the sign-language would never have found favor.

"In former times these doubly or trebly defective children were

summarily dismissed from oral schools with the unjust and inhuman condemnation that they were imbeciles; and even at the present they are quietly dropped from such schools under one pretext or another, because the oral teachers are perfectly well aware that they cannot be educated under their method."

Even the intelligent congenital mute cannot get a fair education at a school where the sign-language is used as the basis of instruction, much less the feeble-minded ones. I admit, those feeble-minded ones are retained at those schools at three hundred dollars a year, as a matter of pecuniary interest only.

"The essential defect in the oral method is, then, that it practically rejects a large proportion of the deaf as incapable of education; that it fails with those who stand in greatest need of a helping hand."

Mind, that cannot be impressed with the meaning of a word, expressing abstract thought by articulation and by writing, can neither be impressed with the meaning of an artificial sign.

Dr. Gallaudet admits that "the radical deficiency of the manual method is, that it makes no provision for imparting the extremely valuable accomplishments of articulation and lip-reading to the large percentage of the deaf that is certainly capable of acquiring these great gifts." The radical deficiency of the manual method, in better words, is, that it is a failure as a means of instructing congenital mutes, and that it perpetrates a gross injustice upon the semi-mutes, in that it renders them dumb.

"The doors of the combined-system schools are wide open to *all* the deaf,—to the weaker as well as to those more richly endowed with capacity for improvement. In these schools no method or appliance is rejected that can be shown to be of practical help to any number, however small, of the great class of the deaf." If this were true, those schools should have established separate classes or schools for the semi-mutes,—an innovation so far never even attempted.

"He who would assume the responsibility of advising parents as to the most desirable course to be pursued in the education of a deaf child should never forget that to teach such a child to speak comes very far short of educating him." How considerate and unselfish!

"In oral schools there is a strong tendency to lay the stress and emphasis of the work of instruction on speech; and to secure success in this, many matters of greater importance to the pupil are sacrificed, for, in spite of the zealous assurances of promoters of oral teaching that speech is an inestimable boon to the deaf,—the thing of paramount importance,—it remains true that there is not one of the main objects sought to be accomplished in the general education of the deaf which will not be seen, with a very little reflection, to be of more consequence to a deaf child than the mere ability to speak and to read from the lips of others."

If the above is not a wilful misrepresentation, it betrays, certainly, ignorance of the subject under consideration; for, after a class of congenital mutes has mastered the mechanism of articulation which is completed within the first year, instruction goes on as in a school for hearing children.

"To be able to read and write intelligently, to possess the knowledge that is imparted in common-school training, to be master of a trade by means of which one may gain a livelihood, to be well grounded in principles of morality, to enjoy an abiding faith in God and a hope of immortal life,—surely each one of these, weighed over against a mere ability to speak, would be found of far greater value to the deaf."

Congenital mutes who are educated by means of the sign-language can hardly acquire a trade in common with the hearing, for the reason that they cannot express themselves intelligently by writing; and their artificial signs are not understood, and certainly look ridiculous, especially to the illiterate; while those taught by articulation do not meet with these obstacles. To cover the failure of their system of signs, those schools were compelled to open workshops in connection with their schools. The religious training of the pupils in those schools cannot be so thorough where the knowledge of language is so meagre.

"The achievement of imparting speech to one who has it not comes so near to being a miracle that one is dazzled by the brilliancy of the triumph, and is apt to feel that every thing else in

the education of the deaf must be subservient to this. Parents and friends of the deaf need to be placed on their guard against this grave error, and to be advised that those schools and systems best deserve their confidence and support that seek to give the broadest and most valuable education possible to *all* the deaf."

After what has been said, the conclusion which the unbiassed will be forced to is, that the combined system, which consists of the sign-language as the basis of instruction, and, in addition, as a side-show, pretends to teach articulation, is a farce, which serves to mislead parents and friends of the deaf; and that the language of signs, instead of being a stepping-stone, is a hinderance to deaf-mutes in the acquisition and in the use of spoken language.

B. ENGELSMAN.

New York, Oct. 8.

Another Magnetic Man.

My attention has been called to the following account from a Lewiston paper, dated Sept. 25, of a scientific phenomenon in which your readers may be interested.

"The writer was entertained Friday evening by a wonderful man, a resident of College Street. The gentleman is a well known citizen of most trustworthy character. After an evening's performance he feels exhausted in the morning. He can do nothing with the palms of his hands on the object, but must use the tips of his fingers only. He first began with a common table with swinging sides. Placing his fingers nearly in the centre, he could cause either end to rise and remain suspended. It would rock, beat time to music, or turn a complete somersault. No part of his person touches the object but his finger-tips; and there are no secret wires, for we examined the table carefully. Next he let down the swinging sides, which are on hinges, and, by placing his finger-tips, could raise the leaf, and hold it in that position several minutes while we tried to pull it away from his fingers. Then we took a heavy braided rug, and folded it in four thicknesses, and placed it on the table. With this obstruction he easily lifted the table, and turned it completely over. A plate was put upon the table, and this proved no hinderance. Then a tin dish inverted was given to him, and still the table not only came up, but the tin dish stuck fast to the table. He lifted chairs and other objects while resting. Then the table was inverted; and, placing his finger-tips upon the table-legs, the heavy table came up, and remained clearly suspended from the floor, with one foot of clear space beneath.

"The writer then sat upon the end of the table, which came up so suddenly as to throw him off upon the floor. At last came a strong test. We seated ourselves in chairs at opposite sides of the table, the writer grasped the table-legs with all his strength, and the gentleman stood clear of the table, and, placing only his fingers upon the smooth surface, drew the table so violently as to bring us down upon the floor in confusion.

"Finally we grasped hands and tested our natural strength in pulling, and the writer was the stronger man; but, as the current came down in his arms, it went up into ours, feeling just the same as when we hold the handles of a battery. Then the strength of the gentleman was wonderful, throwing us around the room as one would handle a toy. The whole evening was filled with these performances. There is no possible chance for deception, and those who have seen this say that the only motive power which these objects receive comes directly from the finger-tips of this man. He can perform the same feats in any room, or with any soft-pine table, which may be placed in any position."

E. W. HALL.

Waterville, Me., Oct. 7.

BOOK-REVIEWS.

Erster Nachtrag zur Bibliographie des Modernen Hypnotismus.
Von MAX DESSOIR. Berlin, 1890.

IN *Science* of June 22, 1888, will be found a notice of the original work to which the author now issues a supplement. The arrangement of the two contributions are practically the same, the

supplement including all that was published from May, 1888, to May, 1890. No more striking proof of the increase of interest in the subject of hypnotism could be furnished than the fact that this record of two years' work includes 382 titles of articles or books, written by 274 authors in 13 different languages, and appearing in 113 periodicals. Very interesting, too, is the variation in interest in different countries that has been going on in the last two years. In the former bibliography the French language was credited with 473 titles; English, with 102 (40 of which were American); Italian, with 88; German, with 69; and the rest scattering. In the supplement France still leads with 139, but Germany (probably in part including Switzerland) is a close second with 103; English comes next with 46 (24 of which are American); Italian following with 32.

The author has evidently done all in his power to render this bibliography useful and complete, and deserves great credit for carrying on this necessarily unpleasant work. He again asks for contributions and notices of works and articles bearing upon hypnotism, to be sent to R  thenerstr. 27 W., Berlin.

Guyot's Earth and Man. Revised edition. New York, Scribner.

THE republication of Guyot's famous lectures on "The Earth and Man" recalls a time which seems, in comparison with the wider opportunities of the present, to be a time of scientific awakening, and which is marked in contrast with this age of conventionalism as a time of scientific enthusiasm. In 1849, when Guyot gave these lectures in French at the Lowell Institute in Boston, the earlier geological surveys of our States were in progress or had but recently been completed. A great fund of fresh scientific information was published by them. Agassiz had come to this country a few years before, and was then about to gather around him the first of the band of students of natural history through whom he so greatly enlightened us. Lyceum lectures then held the place now taken by magazines, and public teachers were orators in the sight of their hearers, not writers hidden behind paper and print. Guyot's book is characteristic of that time. The several chapters retain to perfection the quality of enthusiastic discourses by a man full of his subject and devoted to it. It is doubtless for this charm of style, as well as for the interest of its matter, that the book has so long and deservedly been popular with geographic readers.

Two chief lines of thought run through the book. One is the importance of the vertical element,—the relief of the land; the other is the intimate relation between the conditions of the land and of its inhabitants. Concerning both of these aspects of geography we owe much to Guyot; but the "Earth and Man" hardly represents their present position. The more modern phase of geographic study accepts the importance that Guyot placed on relief, but adds the more direct consideration of local form and its evolution, to which Guyot gave but brief attention. The physical control of human conditions is as attractive a study as when Guyot brought it to us; but, with a fuller understanding of its complexities, we have come to be perhaps more cautious in our generalizations than he was. The modern writer might well hesitate before connecting the great area of our forests and the "melancholy, cold, and insensible" nature of our Indians in the relation of cause and effect.

As a book illustrating a well-marked epoch in our geographical literature, Guyot's "Earth and Man" should be placed in every school library; but, as a school-book for this end of the century, it cannot be highly regarded, although its publishers would seem to place it in that light. It does not appear to us to be true, as is claimed in a prefatory note to the book, that "the present edition of 'Earth and Man' has been revised in a few points affected by the progress of scientific knowledge since the appearance of the work." It would not be Guyot's "Earth and Man" if it were so revised. It would be a new book. Moreover, it possesses few of the qualities desired in a modern text-book. It is not demonstrative or disciplinary in its quality, and this because it accomplishes so precisely the intention of its author. It presents his glowing lectures as they were given; and as such, without significant revision, its republication is welcome.

A Digest of English and American Literature. By ALFRED H. WELSH. Chicago, S. C. Griggs & Co. 12°. \$1.50.

THE object of this work is to give an epitome of English literature from the earliest Anglo-Saxon period to the present day. The matter is arranged in four columns: the first containing a brief mention of the most important historic events; the second, a review of the characteristics of each age, so far as they affected literature; while the remaining two are devoted to the various authors and their principal works. The space given to each author is necessarily small, rarely extending to a page; but the style is concise and sententious, and usually clear, so that a good deal of information is conveyed in a compact and intelligible form. The work is divided into periods; and on the whole the division is well made, though it seems to us that some of the writers credited to the Puritan period belong, both by style and by subject, to the earlier, or renaissance period. As regards the authors who ought to be noticed in such a work as this, opinions will differ somewhat according to the standpoint and the taste of each reader. Some of those to whom Mr. Welsh has accorded considerable space seem to us unworthy of a place in such a book; while others of greater weight and influence, such as Charles Darwin, John Henry Newman, and E. A. Freeman, are not noticed in the body of the work, and receive but a bare mention in the appendix. Such omissions, however, are mostly confined to the concluding portion of the book, and are perhaps accounted for by the author's unfortunate death, which prevented his giving the final touches to his work. On the whole, this digest is excellent, and will be useful not only to students, for whom it is more particularly designed, but also as a reference-book for general readers.

AMONG THE PUBLISHERS.

THE following are among the new publications announced by the J. B. Lippincott Company, Philadelphia: "European Days

and Ways," by Alfred E. Lee; "The Distribution of Wealth," by Rufus Cope, being an examination of the extent and sources of our wealth and its distribution in the different branches of industry and trade, in which the author discusses in a popular manner the various important economical problems now so generally agitated, and by his keen logic adds materially to their solution; "Hermetic Philosophy," including lessons, general discourses, and explications of "Fragments" from the schools of Egypt, Chaldea, Greece, Italy, Scandinavia, etc., designed for students of the Hermetic, Pythagorean, and Platonic sciences and Western occultism, by an acolyte of the "H. B. of L.;" "Gleanings for the Curious from the Harvest-Fields of Literature," a melange of excerpts, collated by C. C. Bombaugh; "The Two Lost Centuries of Britain," by William H. Babcock, in which the author gives an account of the period intervening between the evacuation by the Romans and the commencement of authentic history of modern England, having earnestly and critically sought out the truth embodied in the various legends and traditions current concerning that time, and woven them, with the facts derived from various authoritative sources, into a most interesting and reliable narrative, which will prove a valuable addition to historical literature; "The German Soldier in the Wars of the United States" (2d edition), by J. G. Rosengarten, in which the distinguished part borne by German officers in the Revolution and the war of the Rebellion is thoroughly treated by the author, his work showing careful research; "Medical Diagnosis, with Special Reference to Practical Medicine: A Guide to the Knowledge and Discrimination of Disease," by J. M. Da Costa; "A System of Oral Surgery," by James E. Garretson; "Triumphs of Modern Engineering," by Henry Frith, author of "The Opal Mountain," etc., being a record of the latest and most interesting feats of our own and foreign engineers, showing the advances of modern engineering work—railways, bridges, tunnels, engines, docks, canals, etc.—from the popular point of view, compiled from authentic records and notes, as well

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as from personal experiences; "The Chemistry of Iron and Steel Making, and of their Practical Uses," by U. Mattieu Williams, being written with the well-defined object of supplying to the producers and distributors of iron and steel, and to engineers, ship builders, architects, and others concerned in the use of these important materials, the special scientific knowledge which they all should possess, and in simple, clear, and readable language, the inevitable technicalities being explained as they occur; "Chambers's Encyclopædia," Vol. VI., an entirely new edition, revised and rewritten,—a dictionary of universal knowledge, edited and published under the auspices of W. & R. Chambers, Edinburgh, and J. B. Lippincott Company, Philadelphia, to be completed in ten volumes, issued at intervals of a few months; "Historic Note-Book," by the Rev. E. Cobham Brewer, LL.D., Trinity College, Cambridge, author of "The Reader's Hand-Book," "Dictionary of Phrase and Fable," etc.; and "Regional Anatomy in its Relation to Medicine and Surgery," by George McClellan, M.D., illustrated from photographs taken by the author, of his own dissections, expressly designed and prepared for this work, and colored by him after nature.

—Campanini, the famous tenor, has written a striking article on "How to Train the Voice" for *The Ladies' Home Journal*, and it will appear in the November number of that periodical.

—"The Economics of Prohibition," by James C. Fernald, is a work just issued from the press of Funk & Wagnalls. It is an attempt to show the costliness of dram-drinking, and the efficacy of prohibition as a preventive. The first part of this task is an easy one, and is successfully accomplished; but the argument for

prohibition is less successful, and contains nothing new. Mr. Fernald endeavors to show that high license has proved useless as a promoter of temperance; but the facts he adduces on this point are too meagre to be conclusive. He makes a good point against local option on the ground that it makes an act criminal in one part of the State that is not so in another; but on the whole he leaves the question pretty much as he found it. The style of the book is of that extravagant and excited character that we are accustomed to find in the works of prohibitionists. Why is it that temperance men are usually so intemperate in their language, and when will they learn that soberness and dignity are more persuasive than rant?

—The Colorado College Scientific Society, Colorado Springs, Col., has issued the first number of a yearly volume, to be known as "Colorado College Studies," which shows that there is some activity in this new educational centre. The table of contents is as follows: "Announcement," "A Rigorous Elementary Proof of the Binomial Theorem," by F. H. Loud; "On Certain Cubic Curves," by F. H. Loud; "A Study of the Inductive Theories of Bacon, Whewell, and Mill," by Benjamin Ives Gilman; "A Mathematical Text-Book of the Last Century," by F. Cajori; "Horace, Od. III. 1, 34," by George L. Hendrickson; "Quinti Ciceronis Commentariorum Petitionis XI., § 43 (B. et K. vol. ix. p. 487)," by George L. Hendrickson.

—Herbert Spencer will contribute the opening article for the November number of *The Popular Science Monthly*. It is on "The Origin of Music," and extends the discussion in his essay on "The Origin and Function of Music," opposing Darwin's view that all music is developed from amatory sounds. A criticism by

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the late Mr. Gurney is also replied to in this article. The address of Professor T. C. Mendenhall, as president of the American Association for the Advancement of Science, will be published in the same number. Its subject is "The Relations of Men of Science to the General Public," and it tells scientific men a number of ways in which they can make themselves more useful and better appreciated. There is also an account of the root-tip of a plant, the way it grows, the work it does, and its behavior when subjected to unnatural conditions, by Frederick L. Sargent. "School

Life in Relation to Growth and Health" is the title of a paper by Professor Axel Key of Stockholm. Professor Key maintains that the studies of children, as now ordered, do not allow enough time for rest and growth, and urges a reform in this respect. "The Logic of Free Trade and Protection" will be discussed by Arthur Kitson. Mr. Kitson takes Mr. Blaine as an authoritative exponent of protection, and subjects the doctrine as stated by him to a severe criticism, on the ground of not being a logical outcome of existing facts.

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